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10/714,932	11/18/2003	Susumu Ogawa	HITA.0460	3018

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EXAMINER

RODRIGUEZ, GLENDA P

ART UNIT PAPER NUMBER

2627

DATE MAILED: 11/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/714,932

Applicant(s)

OGAWA ET AL.

Examiner

Glenda P. Rodriguez

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-8, 10, 11-13, 16-18, rejected under 35 U.S.C. 103(a) as being unpatentable over Kado et al. (US Patent No. 6, 101, 164) in view of Matsumoto et al. (US Patent No. 5, 723, 227).

Regarding Claim 1, Kado et al. teach a magnetization control method, comprising:

Providing at least one metal probe (See Element 52);

Controlling the distance between said at least one metal probe and said multilayer film at a range from approximately 0 nm to approximately 10 nm (See Col. 18, L. 9-16, wherein it teaches an AFM controlling the distance from  $10^{-1}$  nm to a few or less than 10 nm. See also Col. 20, L. 30-64 wherein Kado et al. disclose how the medium is being controlled when performing the recording operation.),

And providing an electric field between said at least one metal probe and said multilayer film to set the height of the potential barrier effectively high or low compared with a reference value so as to change the energies of quantum well states formed in the multilayer film, which results in recording information to the multilayer film by changing at least one direction of magnetization of said ferromagnetic layers (See Col. 2, L. 64 to Col. 3, L. 13, wherein Kado et al.

teaches the medium being able to record information with the use of the probe and heating means and Col. 18, L. 9-16, wherein Kado et al. sets the distance of the probe to the medium from  $10^{-1}$  nm to a few nm, which would be effectively high or low to record information or change the quantum state of the film according to Kado et al.).

However, Kado et al. does not explicitly teach a trilayer substrate and the electric field used to record information to the disk. Matsumoto et al. teaches a trilayer magnetic medium as seen in Fig. 6 and Col. 9, L. 39-67 (It is obvious that when recording a magneto optic medium a laser, which is an alternate electric field, is used to emit the specified wavelength to record marks or spots in the medium pertaining to data. According to the Applicant's disclosure of electric field as shown in the Specification in Page 14, L. 19 to Page 15, L. 14). It would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to modify Kado et al.'s invention with the teaching of Matsumoto et al. in order to be able to record data according to a multi film layers in order to obtain an efficient resolution as seen in the Summary of Matsumoto et al.

Claims (3, 10 and 16) have limitations similar to those treated in the above rejection, and is met by the references as discussed above.

Claim (4) has limitations similar to those treated in the above rejections, and is met by the references as discussed above. Claim (4) however also recites the following limitations: "wherein said at least one metal probe is structured so that, between said at least one metal probe and said multilayer film, there is applied a voltage for flowing tunnel current through to read information recorded by a change in said tunnel current corresponding to a change in a direction

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of magnetization due to an electric field which corresponds to the read information (Col. 18, L. 16-19 of Kado et al., wherein it teaches applying a voltage to generate a tunnel current which differs from the recording current. See also Col. 4, L. 1-21 from Kado et al.).”

Claim (12) has limitations similar to those treated in the above rejections, and is met by the references as discussed above. Claim (12) however also recites the following limitations: “providing on a substrate a multilayer film including a first ferromagnetic metallic layer, a non-magnetic metallic middle layer formed on the first ferromagnetic metallic layer, and a second ferromagnetic metallic layer formed on the non-magnetic metallic middle layer and located facing said at least one metal probe (See Fig. 3 of Matsumoto, wherein it teaches Elements 18 and 20 being a magnetic layers and Element 26 as the non-metallic middle layer).”

Regarding Claims 2, 9, 11 and 13, the combination of Kado et al. and Matsumoto et al. teach all the limitations of Claims 3 and 10, respectively. The combination further teach an anti-ferromagnetic layer between the first metallic layer and the substrate (see Fig. 2 of Matsumoto et al., Wherein nonmagnetic or anti-ferromagnetic layer Element 26 is interposed between the substrate Element 14 and the magnetic layer Element 22.).

Regarding Claims 8, the combination of Kado et al. and Matsumoto et al. teach all the limitations of Claim 3. The combination further teach wherein the second ferromagnetic metallic layer of said multilayer film which faces said at least one metal probe is made into domains which have been spatially divided in units of information to be recorded (See Fig. 5 of Matsumoto et al. wherein it teaches arrows which are data unit bit states which are spatially divided or separated from one another.).

Regarding Claim 17, the combination of Kado et al. and Matsumoto et al. teach all the limitations of Claim 16. The combination further teach wherein said at least one metal probe is structured so that, between said at least one metal probe and said multilayer film, there is applied a voltage for following tunnel current through to read information recorded by a change in said tunnel current corresponding to a change in a direction magnetization due to an electric field which corresponds to the read information (Col. 18, L. 16-19 of Kado et al., wherein it teaches applying a voltage to generate a tunnel current which differs from the recording current. See also Col. 4, L. 1-21 from Kado et al.).

Regarding Claims 5 and 18, the combination of Kado et al. and Matsumoto et al. teach all the limitations of Claims 4 and 17, respectively. The combination further teach:

Said multilayer film is formed as a disk-shaped recording medium for rotation (Element 12c in Matsumoto et al.);

Said at least one metal probe is provided to oppose said multilayer film at a tip end of an arm, one end of which is rotatably supported and the other end side of which is extended to said disk-shaped recording medium; And at the tip end of said arm, there is further provided a slider (See Fig. 12 of Kado et al, wherein it teaches Element 82, which is a cantilever, in the system which helps moving the medium to the X, Y and Z directions in Col. 21, L. 53 to Col. 24, L. 23, which is analogous to the function of the Slider Element 22 according to the Applicant's Description of the slider in Pg. 22, L. 6-14);

Whereby a distance between said at least one metal probe and said multilayer film is controlled by said slider so the at least one metal probe will not contact said

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multilayer film (See Col. 18, L. 9-16, wherein it teaches an AFM controlling the distance from  $10^{-1}$  nm to a few or less than 10 nm. See also Col. 20, L. 30-64 wherein Kado et al. disclose how the medium is being controlled when performing the recording operation.);

And wherein said at least one metal probe is structured so that an electric field between said at least one metal probe and said multilayer film is controlled to change at least one direction of magnetization of said ferromagnetic metallic layers for recording information corresponding to said electric field (See Col. 2, L. 64 to Col. 3, L. 13, wherein Kado et al. teaches the medium being able to record information with the use of the probe and heating means and Col. 18, L. 9-16, wherein Kado et al. sets the distance of the probe to the medium from  $10^{-1}$  nm to a few nm, which would be effectively high or low to record information or change the quantum state of the film according to Kado et al.).

3. Claims 7, 14, 15 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kado et al. and Matsumoto et al. as applied in Claims 4 and 17, respectively, further in view of Kobayashi (US Patent No. 6, 687, 200).

Regarding Claims 7 and 20, the combination of Kado et al. and Matsumoto et al. teaches all the limitations of Claims 4 and 17, respectively. However, the combination does not explicitly teach a plurality of probes. Kobayashi teaches a plurality of probes for magnetization of a media (Col. 21, L. 3-12). It would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to modify the combination's invention with the teaching of Kobayashi in order to control the magnetization in the media.

Regarding Claims 14 and 21, the combination of Kado et al., Matsumoto et al. and Kobayashi teach all the limitations of Claims 7 and 20, respectively. The combination further teach wherein the second ferromagnetic metallic layer of said multilayer film which faces said at least one metal probe is made into domains which have been spatially divided in units of information to be recorded (See Fig. 5 of Matsumoto et al. wherein it teaches arrows which are data unit bit states which are spatially divided or separated from one another.).

Regarding Claims 15 and 22, the combination of Kado et al., Matsumoto et al. and Kobayashi teach all the limitations of Claims 3 and 10, respectively. The combination further teach an anti-ferromagnetic layer between the first metallic layer and the substrate (see Fig. 2 of Matsumoto et al., wherein nonmagnetic or anti-ferromagnetic layer Element 26 is interposed between the substrate Element 14 and the magnetic layer Element 22.).

4. Claims 6 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kado et al. and Matsumoto et al. as applied to claims 5 above, and further in view of Kai et al. (US Patent No. 6, 982, 845). The combination of Kado et al. and Matsumoto et al. teaches all the limitations of Claims 5 and 18, respectively. However, the combination does not explicitly teach information being recorded by a provided GMR element or a TMR element. Kai et al. does teach the use of a GMR element to control the magnetization in a disk (Col. 15, L. 32-37). It would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to modify the combination's invention with the teaching of Kai et al. in order to control the current as taught in Col. 4, L. 3-14 of Kai et al.

#### ***Response to Arguments***



5. Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new grounds of rejection due to the newly amended Claims.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

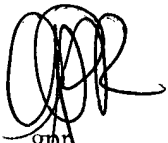
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Glenda P. Rodriguez whose telephone number is (571) 272-7561. The examiner can normally be reached on Monday thru Thursday: 7:00-5:00; alternate Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrea L. Wellington can be reached on (571) 272-4483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
gpr  
11/06/06.  
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